

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A transport layer relay method performed by a transport layer relay device, the method ~~for comprising:~~

terminating, at the transport layer relay device, ~~each of a plurality of first transport layer connections~~ connection between a first source terminal and a first destination terminal at a first transmission rate in the transport layer and a second transport layer connection between a second source terminal and a second destination terminal at a second transmission rate in the transport layer; ~~and~~

relaying data flow ~~on each of said first transport layer connections~~ connection to said first destination terminal as a first relay connection and data flow of said second transport layer connection to said second destination terminal as a second relay connection to respectively separate said first and second transport layer connections;

~~determining a wherein the total transmission rate of relay said first and second relay connections based on the first and second transmission rates that are being used for relay is determined, and said total transmission rate is divided for allotment; and~~

~~allocating the total transmission rate as the transmission rates among each of said first and second relay connections that are being used in relay;~~

wherein the first source terminal, the second source terminal, the first destination terminal, and the second destination terminal are different from each other.

2. (currently amended): ~~A~~ The transport layer relay method according to claim 1, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and the congestion conditions of ~~the~~ a network through which the relay connections pass.

3. (currently amended): ~~A~~ The transport layer relay method according to claim 1, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and the congestion conditions of ~~the~~ a network through which the relay connections pass such that desired effective transmission rates are attained for ~~all~~ each ~~connections~~ connection ~~that are being used in relay.~~

4. (currently amended): ~~A~~ The transport layer relay method according to claim 1, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and the congestion conditions of ~~the~~ a network through which the relay connections pass such that effective transmission rates are attained for ~~of all~~ each ~~relay connections~~ connection ~~that are being used for relay can be attained while~~ , and

wherein conferring priorities to transmission rates for traffic, other than the relay connections, that share shares a bottlenecks bottleneck with the relay connections are allocated differently than transmission rates allocated to the relay connections.

5. (currently amended): ~~A The transport layer relay method according to claim 1,~~ wherein said total transmission rate is ~~divided and allotted~~ allocated to transmission rates of each of said first and second relay connections depending on application information in said data flow ~~on of each of said first and second relay connections.~~

6. (currently amended): ~~A The transport layer relay method according to claim 1,~~ further comprising wherein the results of estimating, by means of measurement packets, the congestion conditions of a network through which the first and second relay connections pass, wherein said congestion conditions are also used to determine said total transmission rate.

7. (currently amended): ~~A The transport layer relay method according to claim 1,~~ wherein the results of further comprising estimating, by means of relay packets, the congestion conditions of a network through which the first and second relay connections pass, wherein said congestion conditions are also used to determine said total transmission rate.

8. (currently amended): A transport layer relay device, wherein said transport layer relay device includes comprising:

a plurality of first terminal-side connection termination units-unit for terminating that terminates each of a plurality of first transport layer connections-connection with-between a first source terminals-terminal and a first destination terminal in a transport layer;

a second terminal-side connection termination unit that terminates a second transport layer connection between a second source terminal and a second destination terminal in a transport layer;-and

a plurality of first interdevice connection termination units-unit for that terminating terminates each of a plurality of first transport layer connections-connection between-with a first transport layer relay devices-device for that relaying-relays transport layer data between each of said first terminal-side connection termination units-unit and each of said first interdevice connection termination unitsunit;

a second interdevice connection termination unit that terminates a second transport layer connection between a second transport layer device that relays transport layer data between said second terminal-side connection termination unit and said second interdevice connection termination unit; and

a transmission rate control unit that controls transmission rates of wherein:-said first and second interdevice connection termination units-transmit in accordance with a transmission rate that is reported from a transmission rate control unit;-and,

wherein the transmission rate control unit determines the a total transmission rate of all interdevice connection termination units that are used in relay, divides allocates said total transmission rate among said first and second interdevice connection termination units, and reports the a respective transmission rates rate that have has been divided and allotted allocated to each said first and second interdevice connection termination unit that is being used in relay units, said first interdevice connection termination unit relaying said first transport layer connection to said first destination terminal as a first relay connection based on said allocated total transmission rate and said second interdevice connection termination unit relaying said second transport layer connection to said second destination terminal as a second relay connection based on said allocated total transmission rate, and

wherein the first source terminal, the second source terminal, the first destination terminal, and the second destination terminal are different from each other.

9. (currently amended): ~~A The transport layer relay~~ device according to claim 8, wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and the connection-specific congestion information ~~that is reported~~ from each interdevice connection termination unit.

10. (currently amended): ~~A The transport layer relay~~ device according to claim 8, wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and connection-specific

congestion information ~~that is reported from each interdevice connection termination unit such~~
~~that the effective transmission rates of all for each relay connections-connection that are being~~
~~used in relay~~ attain a desired transmission rate.

11. (currently amended): ~~A The transport layer relay device according to claim 8,~~
wherein said transmission rate control unit determines said total transmission rate in accordance
with the number of transport layer connections that are being relayed and connection-specific
congestion information ~~that is reported from each interdevice connection termination unit such~~
~~that said effective transmission rates of all for each relay connections-connection that are being~~
~~used in relay~~ are attained ~~while, and~~

~~wherein conferring priorities to transmission rates for traffic, other than the relay~~
~~connections, that share shares a bottlenecks bottleneck with the relay connections are allocated~~
~~differently than transmission rates allocated to the relay connections.~~

12. (currently amended): ~~A The transport layer relay device according to claim 8,~~
further comprising:

an application information analysis unit ~~for that~~, when relaying transport layer data
between each of said first and second terminal-side connection termination units and each of said
first and second interdevice connection termination ~~unit~~ units, ~~analyzing~~ analyzes application
information in said transport layer data ~~[[;]]~~.

wherein said transmission rate control unit ~~divides and allots~~ allocates said total transmission rate among the transmission rates of each of said first and second relay connections based on the application information ~~from~~ analyzed by said application information analysis unit.

13. (currently amended): ~~A~~ The ~~transport layer relay device~~ according to claim 8, further comprising:

a network condition estimation unit ~~for~~ that, based on measurement packets, ~~inferring~~ estimates congestion conditions of ~~the~~ a network through which said first and second relay connections pass~~[[;]]~~.

wherein said transmission rate control unit ~~also~~ uses the results inferred ~~congestion~~ conditions estimated by said network condition estimation unit to determine said total transmission rate.

14. (currently amended): ~~Any one of The~~ The ~~transport layer relay devices~~ device according to claim 8, further comprising:

an inline measurement unit ~~for~~ that, by means of packets that are relayed, ~~inferring~~ estimates congestion conditions of ~~the~~ a network through which said first and second relay connections pass~~[[;]]~~.

wherein said transmission rate control unit ~~also~~ uses the results inferred ~~estimated~~ by said inline measurement unit to determine said total transmission rate.

15. (currently amended): A transport layer relay method performed by a transport layer relay device, the method ~~for comprising:~~

~~terminating, at the transport relay device, each of a plurality of transport layer connections in respective a first transport layers layer and each of a plurality of transport layer connections in a second transport layer; and then~~

~~grouping the plurality of connections in the first transport layer data flows on each of said transport layer connections into one a first relay connection transport layer connection in the first transport layer for relaying and the plurality of connections in the second transport layer into a second relay connection in the second transport layer;~~

~~determining a total transmission rate of the first and second relay connections;~~

~~allocating the total transmission rate among each of said first and second relay connections, wherein: the total transmission rate of the relay connections is determined, and~~

~~wherein the data flows from each of plurality of connections in said first transport layer connections are grouped as the to a first relay connection in accordance with divided a transmission rates rate allocated from the total transmission rate and the plurality of connections in the second transport layer are grouped as the second relay connection in accordance with a transmission rate allocated from the total transmission rate of said total transmission rate.~~

16. (currently amended): ~~A~~ The transport layer relay method according to claim 15, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and congestion conditions of ~~the a~~ network through which the relay connections pass.

17. (currently amended): ~~A~~ The transport layer relay method according to claim 15, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and congestion conditions of ~~the a~~ network through which the relay connections pass such that desired effective transmission rates are attained for ~~all~~ each relay connections connection that are being used in relay.

18. (currently amended): ~~A~~ The transport layer relay method according to claim 15, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and congestion conditions of ~~the a~~ network through which the relay connections pass such that ~~an effective~~ transmission rate ~~rates are attained for of~~ all each relay connections connection that are being used in relay ~~can be attained while, and~~ wherein conferring priorities to transmission rates for traffic, other than the relay connections, that shares shares a bottlenecks bottleneck with the relay connections are allocated differently than transmission rates allocated to the relay connections.

19. (currently amended): A ~~The transport layer relay method according to claim 15,~~
wherein data flows from each of said plurality of connections in the first transport layer and the
plurality of connections in the second transport layer are grouped to a relay connection in
accordance with transmission rates for which said total transmission rate has been divided
allocated based depending on application information in said plurality of connections in the first
transport layer and the plurality of connections in the second transport layer data flows.

20. (currently amended): A ~~The transport layer relay method according to claim 15~~
further comprising, wherein the results of estimating, by means of measurement packets,
congestion conditions of ~~the network~~ through which the first and second relay connections pass,
wherein said congestion conditions are also used to determine said total transmission rate.

21. (currently amended): A ~~The transport layer relay method according to claim 15,~~
~~wherein results of~~ further comprising estimating, by means of relay packets, congestion
conditions of ~~the a network~~ through which the first and second relay connections pass,
wherein said congestion conditions are also used to determine said total transmission rate.

22. (currently amended): A transport layer relay device ~~having comprising:~~

a plurality of terminal-side connection termination units ~~for terminating that terminate~~
transport layer connections ~~with~~ between a plurality of source terminals and a plurality of
destination terminals in the transport layer;

~~one~~ an interdevice connection termination unit ~~for terminating that terminates~~ a plurality
of transport layer connection connections between with a plurality of transport layer relay
devices that relay transport layer data between said plurality of terminal-side connection
termination units and said interdevice connection termination unit; and

an MUX-DEMUX unit ~~for grouping that groups~~ transport layer data from each of said
plurality of terminal-side connection termination units as a plurality of relay connections and
~~transferring~~ transfers the plurality of relay connections to said interdevice connection termination
unit; and

a transmission rate control unit that determines a total transmission rate of the plurality of
relay connections and allocates each transmission rate of the plurality of relay connections based
on the total transmission rate,

wherein~~[[;]]~~ said interdevice connection termination unit transmits said plurality of relay
connections to said plurality of destination terminals in accordance with a ~~the~~ total transmission
~~rate that is reported from a transmission rate control unit;~~

wherein said MUX-DEMUX unit groups data from the plurality of terminal-side
connection termination units in accordance ~~with the distribution of~~ transmission rates that is
~~reported from~~ allocated by the transmission rate control unit~~[[;]]~~, and

~~wherein the transmission rate control unit determines and reports the total transmission rate of said interdevice connection termination unit and reports the distribution allocation of rates among the plurality of relay connections obtained by dividing said total transmission rate to said MUX-DEMUX unit.~~

23. (currently amended): ~~A-The transport layer relay device according to claim 22,~~ wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and congestion information of connections ~~that are reported from the interdevice connection termination unit.~~

24. (currently amended): ~~A-The transport layer relay device according to claim 22,~~ wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and congestion information of connections ~~that is reported from the interdevice connection termination unit such that the effective transmission rate rates of for each of the plurality of relay connections attains attain a~~ desired rate.

25. (currently amended): ~~A-The transport layer relay device according to claim 22,~~ wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and congestion information

of connections that ~~is reported~~ from each interdevice connection termination unit such that ~~the~~
effective ~~rate~~ rates ~~of~~ for each of the plurality of relay connections ~~is~~ are attained ~~while, and~~

wherein conferring priorities transmission rates for to traffic, other than relay
connections, that ~~shares~~ share a ~~bottlenecks~~ bottleneck with the plurality of relay connections are
allocated differently than transmission rates allocated to the relay connections.

26. (currently amended): ~~A~~ The transport layer relay device according to claim 22,
further comprising:

an application information analysis unit ~~for analyzing~~ that analyzes application
information in transport layer data when transport layer data are transferred between each of said
terminal-side connection termination ~~unit~~ units and said MUX-DEMUX unit~~[[;]]~~.

wherein said transmission rate control unit ~~divides~~ allocates said total transmission rate
among the transmission rates of each of the plurality of relay connections and ~~determines the~~
~~distribution that is reported~~ reports the allocated transmission rates to said MUX-DEMUX unit
based on the application information ~~from~~ analyzed by said application information analysis unit.

27. (currently amended): ~~A~~ The transport layer relay device according to claim 22,
further comprising:

a network condition estimation unit ~~for estimating that~~, by means of measurement packets, estimates congestion conditions of ~~the a~~ network through which plurality of relay connections pass~~[[;]]~~.

wherein said transmission rate control unit ~~also uses the results inferred congestion~~ conditions estimated by said network condition estimation unit to determine said total transmission rate.

28. (currently amended): ~~A The transport layer relay~~ device according to claim 22, further comprising:

an inline measurement unit ~~for estimating that~~, by means of packets that are relayed, estimates congestion conditions of ~~the a~~ network through which the plurality of relay connections pass~~[[;]]~~.

wherein said transmission rate control unit ~~also uses the results inferred congestion~~ conditions estimated by said inline measurement unit to determine said total transmission rate.

29. (currently amended): ~~A The transport layer relay~~ method according to claim 1, wherein, when establishing a new transport layer connection between a new source terminal and a new destination terminal, said total transmission rate is determined, said total transmission rate is ~~divided for allotment as transmission rates allocated~~ allocated to each relay connection, and the allotted

transmission rates are reported to the a partner transport layer relay device in establishing said new transport layer ~~protocol~~connection.

30. (currently amended): ~~A~~The transport layer relay device according to claim 8, wherein, when establishing a transport layer connection between a new source terminal and a new destination terminal~~with a terminal~~, an initial transmission rate information~~is reported to the destination terminal that is reported from said transmission rate control unit.~~

31. (currently amended): ~~A~~The transport layer relay method according to claim 15, wherein, when establishing new transport layer connection between a new source terminal and a new destination terminal, said total transmission rate is allocated and the allocated transmission rates~~determined and rates obtained by dividing said total transmission rate~~ are reported to ~~said a~~ partner transport layer relay device in establishing ~~a said new transport layer protocol~~connection.

32. (currently amended): ~~A~~The transport layer relay device according to claim 22, wherein, when establishing a transport layer connection between a new source terminal and a new destination terminal~~with a terminal~~, an initial transmission rate information~~that is reported from said transmission rate control unit is reported to the new destination terminal.~~

33. (currently amended): A program embodied on a tangible computer-readable medium, which when executed by a computer, ~~for causing causes a~~ the computer to function as a transport layer relay device comprising:

a plurality of ~~first~~ terminal-side connection termination units ~~unit for terminating that~~ terminates a first transport layer ~~connections~~ connection between a first source terminal and a first destination terminal with a plurality of terminals on respective transport layers in a first transport layer;

a second terminal-side connection termination unit that terminates a second transport layer connection between a second source terminal and a second destination terminal in a transport layer;

a plurality of ~~first~~ interdevice connection termination units ~~unit for both relaying transport layer data with each of said terminal-side connection termination units, terminating each of a plurality of transport layer connections between transport layer relay devices, and, when transmitting, transmitting in accordance with transmission rates that are reported from a transmission rate control unit~~ that terminates a first transport layer connection with a first transport layer relay device that relays transport layer data between said first terminal-side connection termination unit and said first interdevice connection termination unit;

a second interdevice connection termination unit that terminates a second transport layer connection between a second transport layer device that relays transport layer data between said second terminal-side connection termination unit and said second interdevice connection termination unit; and

a transmission rate control unit that controls transmission rates of said first and second interdevice connection termination units ~~for determining the total transmission rate of all interdevice connection termination units that are being used in relay, dividing said total transmission rate, and reporting rates that have been divided and allotted to each of said interdevice connection termination units that are being used in relay,~~

wherein the transmission rate control unit determines a total transmission rate of all interdevice connection termination units, allocates said total transmission rate among said first and second interdevice connection termination units, and reports a transmission rate that has been allocated to said first and second interdevice connection termination units, said first interdevice connection termination unit relaying said first transport layer connection to said first destination terminal as a first relay connection based on said allocated total transmission rate and said second interdevice connection termination unit relaying said second transport layer connection to said second destination terminal as a second relay connection based on said allocated total transmission rate, and

wherein the first source terminal, the second source terminal, the first destination terminal, and the second destination terminal are different from each other.

34. (currently amended): A program embodied on a tangible computer-readable medium, which when executed by a computer, ~~for causing~~ causes a the computer to function as a transport layer relay device comprising:

a plurality of terminal-side connection termination units ~~for terminating that terminate~~
transport layer connections ~~with~~ between a plurality of source terminals and a plurality of
destination terminals in the transport layer;

~~one~~ an interdevice connection termination unit ~~for terminating that terminates a plurality~~
of transport layer connections between with a plurality of transport layer relay devices that relay
transport layer data between said plurality of terminal-side connection termination units and said
interdevice connection termination unit, and, during transmission, transmitting in accordance
with a transmission rate that is reported from a transmission rate control unit;

a MUX-DEMUX unit ~~for grouping that groups, as one flow,~~ transport layer data from
each of said plurality of terminal-side connection termination units as a plurality of relay
connections and transferring transfers the plurality of relay connections to said interdevice
connection termination unit ~~in accordance with the distribution of rates that is reported from the~~
~~transmission rate control unit;~~ and

a transmission rate control unit that determines a total transmission rate of the plurality of
relay connections and allocates each transmission rate of the plurality of relay connections based
on the total transmission rate for determining and reporting the total transmission rate of said
~~interdevice connection termination unit, and for reporting the distribution of rates obtained by~~
~~dividing said total transmission rate to the MUX-DEMUX unit,~~

wherein said interdevice connection termination unit transmits said plurality of relay
connections to said plurality of destination terminals in accordance with the total transmission
rate,

wherein said MUX-DEMUX unit groups data from the plurality of terminal-side connection termination units in accordance transmission rates allocated by the transmission rate control unit, and

wherein the transmission rate control unit determines the total transmission rate of said interdevice connection termination unit and reports the allocation of rates among the plurality of relay connections to said MUX-DEMUX unit.